



The Brief Case: A Fishy Tale Prevents Digital Doom following Polly's Peck—the Importance of Pets in a Comprehensive Medical History

P. A. Simpson,^a M. Przybylo,^b T. J. Blanchard,^{a,c} T. Wingfield^{a,b,d}

Tropical and Infectious Diseases Unit, Royal Liverpool and Broadgreen University Hospitals Trust, Liverpool, United Kingdom^a; North Manchester General Hospital, Pennine Acute NHS Trust, Manchester, United Kingdom^b; Faculty of Biology, Medicine, and Health, University of Manchester, Manchester, United Kingdom^c; Institute of Infection and Global Health, University of Liverpool, Liverpool, United Kingdom^d

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CASE

In August 2014, a 68-year-old man sustained a deep bite to his left fourth and fifth fingers from his pet African gray parrot (*Psittacus erithacus*). The gentleman had a past medical history of chronic obstructive pulmonary disease, for which he took regular inhaled steroids, salbutamol, and ipratropium. He was also severely affected by osteoarthritis, for which he took long-acting morphine as analgesia. A day following the parrot bite, he saw his family practitioner for a consultation. The practitioner noted a laceration over the fourth proximal interphalangeal phalanx (PIP) with surrounding erythema, and a course of oral antibiotics was prescribed for a presumed diagnosis of bacterial cellulitis. In December 2014, following a review by orthopedic and rheumatology specialists because of persistent swelling, an ultrasound and magnetic resonance imaging (MRI) scan of the left hand were performed, which showed soft tissue swelling but no radiological features to suggest osteomyelitis. In April 2015, the fourth PIP wound continued to be slow to heal and the patient developed an erythematous nodule over the fifth PIP.

In October 2015, the patient again visited his general practitioner with worsening fourth finger swelling and erythema and a new erythematous, fleshy nodule on the dorsal aspect of the left wrist. In November 2015, a rheumatologist injected steroids into the fourth PIP joint. In December 2015, the fourth PIP wound reopened and his entire left hand became erythematous and swollen, and an inpatient MRI showed fourth finger osteomyelitis (Fig. 1a). The orthopedic team performed an initial washout with debridement, and amputation was considered. In February 2016, a second washout was performed from which deep tissue swabs showed acid- and alcohol-fast bacilli on a smear.

A day later, the patient was reviewed by the regional infectious disease team. Clinical examination revealed a dehiscence postsurgical fourth finger wound with severe surrounding edema (Fig. 1b). A comprehensive medical history revealed that, in addition to the African gray parrot, the patient kept tropical fish and had cleaned the fish tank thoroughly following the parrot bite. A clinical diagnosis of *Mycobacterium marinum* was made, and treatment with rifampin and ethambutol was started. In March 2016, mycobacterial colonies were grown 3 weeks into culture of the deep tissue swabs on both solid glycerol and pyruvate Löwenstein-Jensen medium slopes. These colonies were then further identified as *M. marinum* by the GenoType Mycobacterium CM molecular assay (Hain Lifescience). In April 2016, rifampin was substituted for azithro-

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Address correspondence to T. Wingfield, T.E.Wingfield@liverpool.ac.uk.

For answers to the self-assessment questions and take-home points, see page 2290 in this issue (<https://doi.org/10.1128/JCM.02341-16>).

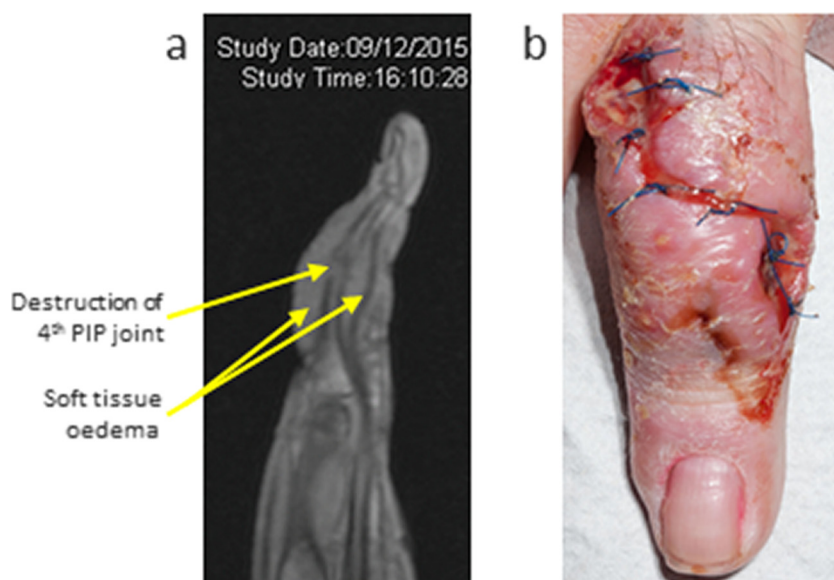


FIG 1 (a) MRI scan of the left hand showing osteomyelitis with complete destruction of the fourth PIP joint and significant soft tissue edema. (b) Dehiscence of the left fourth finger wound following orthopedic debridement and deep tissue sampling.

mycin because rifampin caused decreased efficacy of the patient's opiate analgesia. Over the next 6 months, the patient's symptoms gradually improved on treatment; he avoided amputation of his finger and regained full digital function.

DISCUSSION

Multiple zoonoses, including *M. marinum*, can be transmitted from domestic animals through bites, scratches, or contact with their bodily fluids or feces (Table 1) (1, 2). Domestic animal bites are not an uncommon presentation to the emergency department. While the majority of such bites are from dogs and cats, there has been a rise in the number of people keeping more exotic animals from which infections can occur (1). Commonly isolated pathogens relating to animal bites include *Pasteurella* species from dogs and cats, *Salmonella* from reptiles, and *Streptobacillus moniliformis* from rats (the cause of rat bite fever).

M. marinum is a naturally occurring aquatic organism found in freshwater and salt water. In humans, *M. marinum* predominantly causes soft tissue infections following exposure to contaminated water. The most common presentation is "fish tank granuloma" (3), i.e., hand infection following exposure to fish tank water. The majority of cases have a preceding injury to the hand (e.g., bites, abrasions, or puncture wounds) prior to the exposure that allowed entry of the mycobacterium through the dermis and into the soft tissue. Prior to the introduction of routine chlorination of swimming pools,

TABLE 1 Pathogens commonly associated with domestic animals^a

Animals	Commonly associated pathogen(s)
Dogs and cats	<i>Pasteurella</i> , <i>Streptococcus</i> , <i>Staphylococcus</i> , <i>Neisseria</i> , <i>Fusobacterium</i> , <i>Porphyromonas</i>
Birds	<i>Chlamydia psittaci</i> , ^b <i>Cryptococcus neoformans</i> , avian influenza virus
Reptiles	<i>Salmonella</i>
Rodents	<i>Salmonella</i> , <i>Francisella tularensis</i> , <i>Streptobacillus moniliformis</i> , ^c lymphocytic choriomeningitis virus, <i>Trichophyton</i>
Fish	<i>Mycobacterium marinum</i> , <i>Erysipelothrix rhusiopathiae</i>

^aFrom reference 1.

^bCauses psittacosis.

^cCauses rat bite fever.

swimming pools were the leading source of acquisition of infection and fish tank granuloma was termed “swimming pool granuloma” (3).

Symptoms of *M. marinum* skin and soft tissue infection usually start as a solitary violaceous plaque, nodule, or nonhealing ulcer, followed by a typical sporotrichoid rash. A sporotrichoid rash is one in which erythematous fleshy nodules spread proximally from the source of the infection (most commonly a wound on the hands) along the lymphatic system. The lesion that our patient described developing over his wrist was the early progression of a sporotrichoid rash. Skin and soft tissue infection is the most common presentation, with disseminated infection being rare and usually only occurring in immunocompromised people, including those who have had chemotherapy and HIV-positive patients (3).

With regard to culture and identification of *M. marinum*, the organism has an intermediate growth rate with an optimum growth temperature that is lower than that of other mycobacteria. Skin biopsy specimens of suspected *M. marinum* should be inoculated into slopes containing pyruvate Löwenstein-Jensen medium and then incubated at 28 to 30°C. Molecular assays such as the GenoType Mycobacterium CM molecular assay (Hain Lifescience) can then be used to identify mycobacterial species. While resistance testing is sometimes performed, it is not routinely required in the clinical setting unless the patient experiences treatment failure or has repeated positive cultures following appropriate treatment.

There is a dearth of evidence regarding optimal treatment for *M. marinum*. Combination therapy with clarithromycin or rifampin with ethambutol is the most widely used regimen, with high reported cure rates (4, 5), but the use of this regimen is supported by prospective or retrospective cohort analyses rather than randomized control trial level evidence. Other potential agents used for mild disease can include trimethoprim-sulfamethoxazole and doxycycline. Treatment should continue for 1 to 2 months following symptom resolution, which typically means approximately 3 to 4 months of treatment. Isoniazid, streptomycin, and pyrazinamide should not be used because of the innate resistance of *M. marinum* to these antimycobacterial agents (5).

Clinicians must be cognizant of interactions between certain antimicrobials used to treat *M. marinum* and other medications. For example, rifampin is a potent cytochrome P450 enzyme inducer, whereas macrolide antibiotics (such as azithromycin and clarithromycin) are cytochrome P450 enzyme inhibitors. Common interactions of rifampin and macrolides with other medications include a decrease (rifampin) or increase (macrolides) in the drug concentrations of opiate analgesia, certain antiepileptic medications, and oral anticoagulants. In the case of our patient, rifampin induction caused a decrease in the effectiveness of his opiate analgesia and therefore had to be replaced with azithromycin.

Pet ownership is an often neglected part of a medical history with both patients and health care professionals sometimes being unaware of the potential risks of zoonotic diseases (5). In this case, eliciting multiple pet ownership—after an 18-month diagnostic delay—contributed to saving this gentleman’s *M. marinum*-infected finger from amputation.

SELF-ASSESSMENT QUESTIONS

1. Which of the following organisms is correctly paired with a domestic animal with which it is associated?
 - A. *Histoplasma capsulatum* and dogs
 - B. *Mycobacterium marinum* and parrots
 - C. *Streptobacillus moniliformis* and rats
 - D. Hantavirus and reptiles
2. Which of the following is the most common clinical presentation of *Mycobacterium marinum* infection in humans?
 - A. Pulmonary disease
 - B. Disseminated disease

- C. Gastrointestinal disease
 - D. Skin and soft tissue disease
3. Which of the following regimens is a recognized management option for treatment of *Mycobacterium marinum* skin and soft tissue infection?
- A. Rifampin or clarithromycin and ethambutol
 - B. Pyrazinamide
 - C. Isoniazid and streptomycin
 - D. Trimethoprim

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